

Ultraviolet radiation

Human Health Risk	M
Ecological Risk	M - H
Socioeconomic Risk	M - H

Ultraviolet (UV) radiation is a form of electromagnetic energy whose only significant natural source is the sun. Stratospheric ozone absorbs harmful forms of ultraviolet light and depletion of the ozone layer results in increased UV radiation reaching the Earth's surface. Ultraviolet radiation is divided into categories based on wavelength; the impacts noted here are associated with ultraviolet radiation known as UV-B. UV-B damages biological systems by causing chemical changes at the molecular level and its effects are evident in animals, plants, and microorganisms. In humans, UV-B exposure is known to be associated with various skin cancers, accelerated skin aging, cataract and other eye diseases, and may reduce a person's ability to resist infectious diseases.

What's at risk?

Virtually the entire population of New Jersey is exposed to some level of naturally occurring UV-B daily. People with fair skin are more susceptible to burns and skin cancers than darker skinned individuals. However, eye damage can occur in all populations. Beachgoers and other outdoor enthusiasts are at increased risk. Ecologically, all species in all parts of the state are exposed and potentially susceptible to the damage caused by UV-B radiation. More research is needed to document the extent and severity of UV exposure and effects in human and ecological populations.

What are the human health impacts in New Jersey?

In New Jersey, several thousand persons are diagnosed with malignant skin melanomas. Available information documents an increase each year in the rate of melanoma for the years 1993 through 1996. While individual behaviors are a factor in exposure to UV radiation, the reduction in stratospheric ozone may also be contributing to increases in the numbers of cases of melanoma. Other forms of skin cancer (i.e., basal and squamous cell) may also be increasing in response to increased UV radiation, but since these are not reportable diseases, no data are available. The extent of health effects other than skin cancers (e.g., eye problems, immune disorders) attributable to UV radiation is not known.

What are the ecological impacts in New Jersey?

Ultraviolet radiation poses one of the greatest potential risks to New Jersey ecosystems. In aquatic

ecosystems, UV radiation has adverse effects on the growth and photosynthesis of phytoplankton, thus affecting food webs, which in turn can damage the ecosystem's ability to function. In terrestrial systems, increasing amounts of UV-B may be causing a number of subtle changes in the competitive balance among plants. Specific exposures and effects are dependent upon site-specific variables such as cloud cover, reflection, and proximity to industrial areas. Species-specific traits also determine the severity of effects.

What are the socioeconomic impacts in New Jersey?

Economic costs and psychological impacts from UV radiation are significant. Medical costs associated with skin cancer treatments may total over \$50 million annually. Cataract treatment for problems resulting from UV radiation may total an additional \$31 million. People do worry about and avoid sun exposure, and parents are concerned about the exposure of their children.

What's being done?

The international "Montreal Protocol" agreement was intended to reduce and eventually eliminate the emissions of man-made substances that deplete stratospheric ozone. The federal Clean Air Act was subsequently amended to include provisions for the protection of the ozone layer. These regulations include a schedule that is currently being implemented for reducing the production and use of ozone depleting chemicals. Education efforts focused on reducing human exposures to ultraviolet radiation help to reduce human health risk.